

NOISE ASSESSMENT

on behalf of

LRD PROPERTY LIMITED

for the site at

**1 - 3 GRIMSHAW STREET, BURNLEY, BB11
2AS**

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Summary

A noise assessment was undertaken to predict the potential impact of existing noise levels on a proposed residential development at 1 – 3 Grimshaw Street, Burnley.

Short term noise measurements were taken at three locations around the site, and these were supplemented with a previous longer term survey carried out on adjacent roads prior to Covid-19 restrictions being in place. Analysis and comparison between both surveys was carried out in order to determine suitable representative noise levels for the site.

Specifications for glazing and ventilation have been provided in order to ensure suitable internal noise levels at the development. The most sensitive area of the proposed development are the bedrooms facing Grimshaw Street, which will require enhanced glazing configurations and acoustic rated trickle ventilators in order to mitigate traffic noise.

In conclusion, with the implementation of the mitigation measures detailed in this report, it is considered that a suitable and commensurate level of protection against noise will be provided to the occupants of the proposed accommodation.

Record of changes

Prepared By Michael Rickard MIOA

Reviewed By Jo Miller MIOA

Signed



Signed



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1 Introduction

- 1.1 Miller Goodall Ltd has, on behalf of LRD Property Limited, undertaken a noise assessment in respect of the impact of noise from environmental sources at a proposed residential development for 8no residential apartments in Burnley. The proposal also includes for 2no small commercial units. Mitigation advice for protection from noise between the commercial units and residential dwellings is provided in a separate acoustic report (ref. Sound Insulation Detailing Advice, report number 102537).

2 Site Description

- 2.1 The site is located at 1 - 3 Grimshaw Street, Burnley, BB11 2AS. The site location is shown outlined in red in Appendix 1.
- 2.2 The site is located in a largely commercial area in the centre of Burnley. Grimshaw Street is adjacent the front of the property to the northwest, with Nicholas Street approximately 15m to the southeast and Manchester Road approximately 15m to the northwest. To the southwest is an enclosed courtyard area which includes 1no small kitchen extract opening.

3 Proposed Development

- 3.1 The proposal is to convert the existing building to provide 8no residential apartments, as well as 2no retail units at ground floor level fronting Grimshaw Street.

4 Policy Context

4.1 Noise Policy Statement for England

- 4.1.1 The Noise Policy Statement for England (NPSE¹), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse effects on health and quality of life;
- mitigate and minimise adverse effects on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.”

- 4.1.2 The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and the quality of life occur.

¹ Noise Policy Statement for England, Defra, March 2010

- 4.1.3 The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the Statement). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case:

“...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development”.

- 4.1.4 Importantly, the NPSE goes on to state:

“This does not mean that such adverse effects cannot occur”.

- 4.1.5 The Statement does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor and the time in question. NPSE advises that:

“Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available”

- 4.1.6 It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

4.2 National Planning Policy Framework

- 4.2.1 The National Planning Policy Framework (NPPF²) initially published in March 2012, was updated in June 2019. One of the documents that the NPPF replaces is Planning Policy Guidance Note 24 (PPG 24) “Planning and Noise”³.

- 4.2.2 The revised NPPF advises that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives). One of these is an environmental objective which is described in par. 8 (c):

“to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.”

- 4.2.3 At par. 170 we are advised that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development

² National Planning Policy Framework, Ministry of Housing, Communities and Local Government, June 2019

³ Planning Policy Guidance 24: Planning and Noise, DCLG, September 1994

should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

4.2.4 Par. 180 goes on to state:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

4.3 Planning Practice Guidance – Noise

4.3.1 As of March 2014, a Planning Practice Guidance⁴ for noise was issued which provides additional guidance and elaboration on the NPPF, the guidance was updated in July 2019. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

4.3.2 In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

“...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation”.

4.3.3 Examples of these factors include:

- The source and absolute noise level of the source along with the time of day that it occurs;
- Where the noise is non-continuous, the number of noise events and pattern of occurrence;
- The frequency content and acoustic characteristics of the noise;
- The effect of noise on wildlife;
- The acoustic environment of external amenity areas provided as an intrinsic part of the overall design;
- The impact of noise from certain commercial developments such as night clubs and pubs where activities are often at their peak during the evening and night.

⁴ Planning Practice Guidance – Noise, <https://www.gov.uk/guidance/noise--2> 22nd July 2019.

- 4.3.4 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

"Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed".

- 4.3.5 The PPG was amended in December 2014 to clarify guidance on the potential effect of noise from existing businesses on proposed new residential accommodation. Even if existing noise levels are intermittent (for example, from a live music venue), noise will need to be carefully considered and appropriate mitigation measures employed to control noise at the proposed accommodation.

5 Local Authority Consultation

- 5.1 The proposed development has been submitted for planning approval (ref. COU/2020/0526) and the following has been recommended for condition should the development be approved:

"No development shall start until a noise assessment of the noise likely to affect the development has been submitted to and approved in writing by the Local Planning Authority. The assessment shall take into account the noise from surrounding road networks and any other noise sources which are deemed significant on the site. The assessment shall identify all noise attenuation measures which may be determined appropriate to reduce the impact of noise on the residential properties, and internal transmission of noise between properties. Once approved in writing, all noise control measures shall be implemented and thereafter retained."

- 5.2 An email was sent to Environmental Health at Burnley Council on 8th February 2021 to discuss our proposed methodology for the assessment. We proposed to use previously measured noise data from an assessment close to the site (ref. NOT/2016/0581) as, due to the central location of the site, which is predominantly commercial, we had concerns that noise levels at the time of the survey would not be representative due to current Covid-19 restrictions.
- 5.3 We did not receive an email response, however our client has since spoken to an EHO from the council on telephone. The EHO agreed that it would be acceptable to use the previously measured noise levels from the application cited above; provided that our assessment considers any differences that may be applicable in relation to the proposed site.
- 5.4 Mitigation advice for protection from noise between the commercial units and residential dwellings is provided in a separate acoustic report (ref. Sound Insulation Detailing Advice, report number 102537).

6 Acoustic Standards and Guidance

6.1 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

- 6.1.1 This standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999)⁵. These guideline noise levels are shown in Table 1 below.

Table 1: BS 8233: 2014 guideline indoor ambient noise levels for dwellings

Location	Activity	07:00 to 23:00	23:00 to 07:00
Living Room	Resting	35 dB $L_{Aeq,16hr}$	-
Dining room/area	Dining	40 dB $L_{Aeq,16hr}$	-
Bedroom	Sleeping (daytime resting)	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

- 6.1.2 BS 8233:2014 advises that:

“regular individual noise events...can cause sleep disturbance. A guideline value may be set in terms of SEL^6 or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values”.

- 6.1.3 BS 8233:2014 adopts guideline external noise values provided in WHO for external amenity areas such as gardens and patios. The standard states that it is “desirable” that the external noise does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ whilst recognising that development in higher noise areas such as urban areas or those close to the transport network may require a compromise between elevated noise levels and other factors that determine if development in such areas is warranted. In such circumstances, the development should be designed to achieve the lowest practicable noise levels in external amenity areas.

⁵ World Health Organisation Guidelines for Community Noise, 1999

⁶ Sound exposure level or L_{AE}

6.2 World Health Organisation (WHO) Guidelines for Community Noise 1999

- 6.2.1 The WHO Guidelines 1999 recommends that to avoid sleep disturbance, indoor night-time guideline noise values of 30 dB L_{Aeq} for continuous noise and 45 dB L_{AFmax} for individual noise events should be applicable. It is to be noted that the WHO Night Noise Guidelines for Europe 2009⁷ makes reference to research that indicates sleep disturbance from noise events at indoor levels as low as 42 dB L_{AFmax} . The number of individual noise events should also be taken into account and the WHO guidelines suggest that indoor noise levels from such events should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night.
- 6.2.2 The WHO document recommends that steady, continuous noise levels should not exceed 55 dB L_{Aeq} on balconies, terraces and outdoor living areas. It goes on to state that to protect the majority of individuals from moderate annoyance, external noise levels should not exceed 50 dB L_{Aeq} .

6.3 BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

- 6.3.1 BS 4142:2014+A1:2019⁸ provides guidance on the assessment of the likelihood of complaints relating to noise from industrial sources. It replaced the 1997 edition of the Standard in October 2014 and was amended in June 2019. The amended version corrected a number of printing errors and further clarified that the standard is used to assess external noise levels, and not internal noise levels (although this can form part of the discussion regarding context). The key aspects of the Standard are summarised below.
- 6.3.2 The standard presents a method of assessing potential noise impact by comparing the noise level due to industrial sources (the Rating Level) with that of the existing background noise level at the nearest noise sensitive receiver in the absence of the source (the Background Sound Level).
- 6.3.3 The Specific Noise Level - the noise level produced by the source in question at the assessment location - is determined and a correction applied for certain undesirable acoustic features such as tonality, impulsivity or intermittency. The corrected Specific Noise Level is referred to as the Rating Level.
- 6.3.4 In order to assess the noise impact, the Background Sound Level is arithmetically subtracted from the Rating Level. The standard states the following:
- *Typically, the greater this difference, the greater the magnitude of the impact,*
 - *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context,*
 - *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context,*
 - *The lower the Rating Level is relative to the measured Background Sound Level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the Rating*

⁷ WHO Night Noise Guidelines for Europe 2009

⁸ BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

Level does not exceed the Background Sound Level, this is an indication of the specific sound source having a low impact, depending on the context.

- 6.3.5 In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014+A1:2019 edition places emphasis upon an appreciation of the context, as follows:

An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.

- 6.3.6 The 2014 edition of BS 4142 also introduced a requirement to consider and report the uncertainty in the data and associated calculations and to take reasonably practicable steps to reduce the level of uncertainty.

7 Noise Surveys

7.1 Introduction

- 7.1.1 We have referred to data from a noise survey carried out in 2016 for the building directly south of the proposed development, Ashworth House, which is cited on the opposite side of the internal courtyard. The Apex Acoustics report (ref. 5774.1 for application ref. NOT/2016/0581) details the measured noise levels at two locations close to the proposed site; one on Manchester Road and one on Nicholas Street.
- 7.1.2 This data has been supplemented with our own short term measurements at the site in order to determine the likely representative noise levels at the site – i.e. pre and post Covid-19 restrictions.
- 7.1.3 The short term survey that we carried out on 19 March 2021 is described in the section below, followed by a section of comparative analysis with the longer term Apex Acoustics survey for determining representative noise levels for our assessment.

7.2 Measurements of Existing Noise Sources

- 7.2.1 Short term noise measurements were undertaken at the front and rear of the proposed development, with a third measurement taken on Manchester Road for comparison with the earlier Apex Acoustics survey in 2016. Measurements were made in accordance with BS 7445-1: 2003⁹ by Reid Malster of Miller Goodall Ltd. The calibration of the sound level meter was checked before and after measurements with negligible deviation (<0.1 dB). Details of the equipment used are shown in Table 2 below.

⁹ BS 7445-1: 2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures

Table 2: Noise monitoring equipment

Equipment Description	Type Number	Manufacturer	Serial No.	Date Calibrated	Calibration Certification Number
Class 1 ^{10,11} Integrating Real Time 1/3 Octave Sound Analyser	NOR 140	Norsonic	1407510	13/12/2019	473910536
Microphone	NOR 1225	Norsonic	384687	15/01/2021	N/a*
Class 1 Calibrator ¹²	NOR 1251	Norsonic	34123	20/07/2020	04743/2

*No reference number available, but the certificate is available upon request.

Table 3: Dates, times and weather conditions during noise measurements

Measurement Location	Date	Time	Weather conditions
P1, P2 & P3	19/03/21	12:20 – 13:10	Overcast, dry, 11 °C, wind < 3m/s

- 7.2.2 Measurements at each position were made at a height of 1.5 m above the ground and approximately 1m from the building façade; all reported levels therefore include a -3 dB façade reflection correction to give the equivalent free-field level at the building façade.
- 7.2.3 The survey measurement locations are shown in Figure 3 in Section 7.4 below.
- 7.2.4 During the survey, a single high level extract grille was observed in the courtyard area which is believed to be an extract vent belonging to a takeaway kitchen. No noise was emitting from this grille during our measurements and the restaurant was closed.

¹⁰ IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

¹¹ IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

¹² IEC 60942 (2003) Electroacoustics – Sound calibrators

Figure 1: 1F level takeaway kitchen extract**Figure 2: 1F level takeaway kitchen extract location**

7.3 Monitoring Results

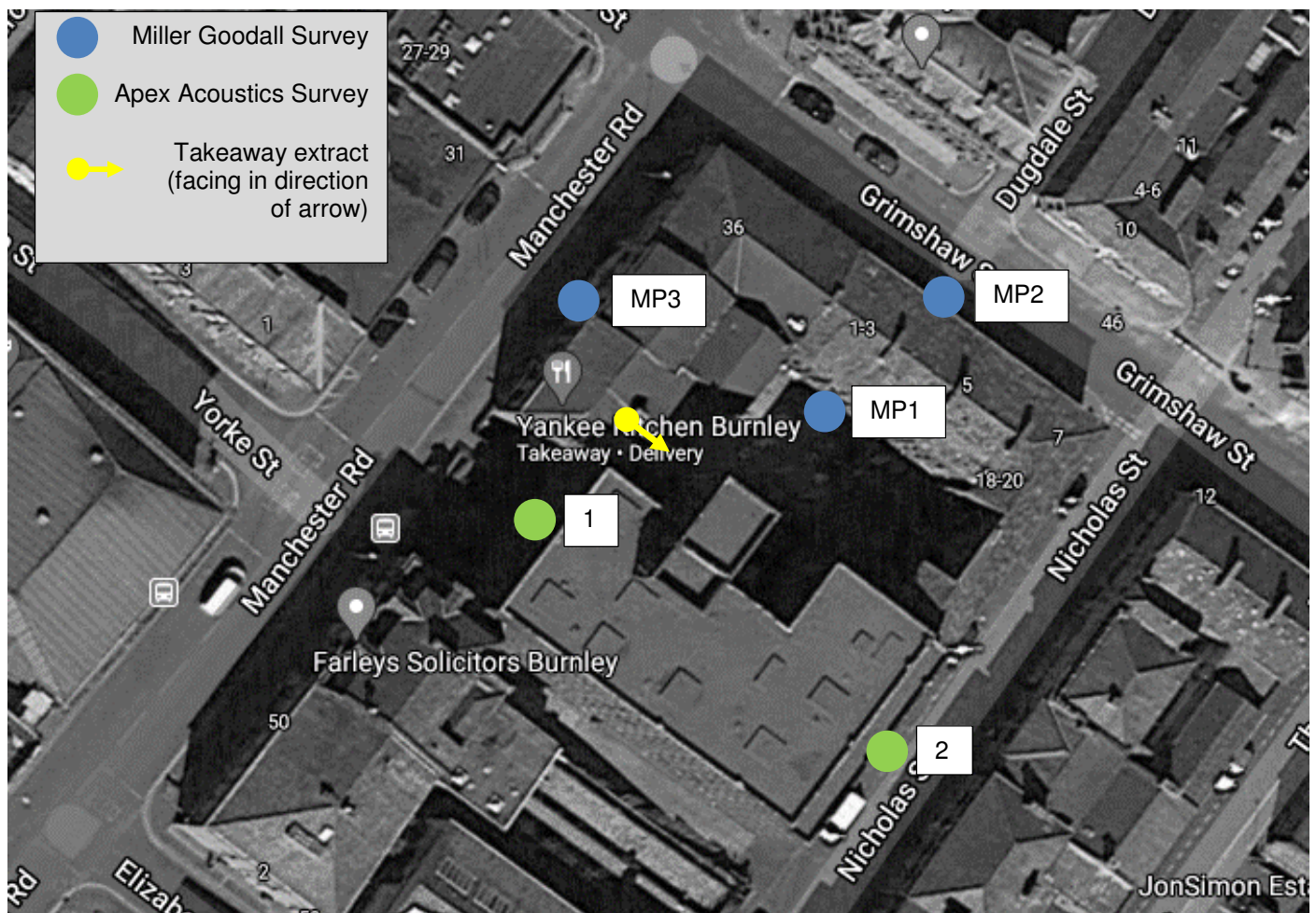
- 7.3.1 A summary of the broadband measurement data is provided in Table 4 below. All data are sound pressure levels in dB re 20 μ Pa.

Table 4: Summary of noise measurements (equivalent free-field)

Measurement Location	Start Time	Elapsed Time (hr:min:sec)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)
MP 1	12:21	00:10:10	43	60
MP 2	12:37	00:15:01	61	79
MP 3	12:53	00:17:04	63	82

7.4 Analysis and Comparison with 2016 Survey

7.4.1 Survey measurement positions for both our survey, and the 2016 survey by Apex Acoustics, are shown in Figure 3 below.

Figure 3: Survey locations

7.4.2 MP1 Discussion

7.4.3 Measurement MP1 was in the courtyard and is representative of noise levels for occupied rooms with windows on this façade (Bedrooms and Kitchen Lounges). The noise levels measured here were low. A level of 43 dB $L_{Aeq,T}$ during the daytime would put MP1 into the ProPG category of 'No Adverse Effect', which is for anything below 50 dBA during the daytime. The noise Level is likely to drop by more than 3 dB in the night time, and this would also put the night time levels in the 'No Adverse Effect' category. Similarly the $L_{AFmax,T}$ of 60 dBA is considered a negligible risk in terms of ProPG. It should be noted that ProPG (Planning & Noise; Professional Practice Guidance on Planning and Noise, New Residential Development, May 2017) is only relevant for new build residential developments – however it is mentioned here for context regarding the low risk of the noise levels measured.

7.4.4 The takeaway kitchen extract is located well away from the proposed residential façade and benefits from screening – there is no line of site to the extract grille. Although it was not possible to measure the noise from this grille, it is considered unlikely that it would cause a significant impact at the proposed residential façade. Notwithstanding this, as a measure to mitigate any uncertainty, we would recommend that residential windows on this façade incorporate standard through-frame trickle ventilators so that background ventilation can be supplied to the rooms without the necessity to open windows. This advice is outlined in Section 9 of this report. In practice however, internal noise levels are expected to be within suitable limits even with windows open throughout the day and night.

7.4.5 MP2 Discussion

7.4.6 The average (L_{AeqT}) noise level at MP2 was approximately 2 dB quieter than that measured at MP3, which is in keeping with expectations for a more minor two lane one-way street, in comparison to Manchester Road (MP3), which is a main road and throughfare.

Daytime Average Noise Level

7.4.7 To assess the likely noise levels at MP2 in more detail we refer to the longer term Apex Acoustics measurements at their survey position (1) on Manchester Road. The daytime noise level measured here was $L_{Aeq,T}$ 63 dBA. However the Apex survey position was twice as far away from the centre of the road in comparison to our measurement at MP3 (approximately 14m vs 7m), therefore if we add a +3 dB line source correction to the Apex measurement, we arrive at a comparative level of 66 dBA for the Apex measurement on Manchester Road, (compared to our short term measurement of 63 dBA at MP3).

7.4.8 In practice the noise levels during the Apex survey at position (1) may not have reached 66 dBA, as the reflections from the surrounding building facades would have added to the measured levels and thereby increased them relative to the theoretical level, based purely on line source attenuation to the façade. It is therefore considered worst case to assume a level at MP3, pre and post Covid-19 restrictions, of 66 dBA.

7.4.9 This would equate to a doubling of road traffic intensity on Manchester Road compared to what we measured during our survey, which seems like a reasonable assumption. If we thereby make the same assumption for the traffic intensity at MP2, we would add 3 dB to the measured levels at MP2, and determine that a reasonable assumption of noise levels under normal conditions would be 64 dB $L_{Aeq,T}$ during the daytime.

Night Time Average Noise Level

7.4.10 The long term Apex Acoustics survey determined a 10 dB drop between daytime and night time noise levels on Manchester Road, again this seems reasonable, and applying the same reduction to the 64 dB daytime level that we have determined for Grimshaw Street at MP2, we arrive at an assumed night time average ($L_{Aeq,T}$) noise level of 54 dB.

7.4.11 Night Time Maximum Noise Level

7.4.12 The night time maximum level reported by Apex Acoustics was 70 dB L_{AFmax} . A point source correction to gain a comparative level at 7m from the centre of Manchester Road, (i.e. equivalent to our MP3), gives a night time maximum level of 76 dBA. However we measured a daytime maximum of 82 dBA at MP3 position. Although this is 6 dB higher, it was the highest maximum measured over approximately 17 minutes. There are a much greater number of vehicles on the road during the daytime, which therefore produce many more frequent maximum noise level events. Furthermore WHO guidance is based on assessment of the 15th highest maximum level measured during the night time. These two factors are considered to be the reason for the lower maximum level reported in the Apex night time survey; and similarly, it would be unreasonable to assume that the maximum level that we recorded during our daytime survey is representative of the 15th highest maximum expected during the night time.

7.4.13 The maximum level that we measured at MP2 was 79 dB L_{AFmax} . This is 3 dB louder than the distance corrected night time maximum level for the Apex survey (i.e. indicative of the equivalent night time level at MP3). As we measured a 3 dB difference in maximum noise levels at MP3 compared to MP2, we proposed a relatively modest 3 dB reduction of the MP2 daytime maximum to determine a night time maximum of 76 dB L_{AFmax} (rather than the 6 dB reduction indicated by comparing our MP3 measurement with the Apex (1) measurement). This assumed maximum would therefore also be the same as the night time maximum measured on Manchester Road in the Apex survey (taking distance corrections into account), which therefore seems sensible.

Summary

7.4.14 In summary therefore, the representative noise levels at the Grimshaw Street façade of the proposed development are determined as follows.

Grimshaw Street façade noise levels:

- Daytime $L_{Aeq,T}$ 64 dB
- Night time $L_{Aeq,T}$ 54 dB
- Night time $L_{AFmax,T}$ 76 dB

7.4.15 Octave band frequency data was obtained during our measurements, and this was utilised within the noise ingress calculations to determine suitable mitigation in terms of glazing and ventilation requirements. This source data is provided in Table 5 below.

Table 5: Octave band free-field external noise level spectra at Grimshaw Street façade

Measurement Descriptor	Sound Pressure Level, dB at Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Daytime $L_{Aeq,T}$	73	63	62	60	61	56	51	50	64
Night time $L_{Aeq,T}$	63	53	52	50	51	46	41	40	54
Night time $L_{AFmax,T}$	88	74	71	67	71	68	62	71	76

- 7.4.16 It is very notable that in terms of frequency recordings, our survey measured much greater low frequency noise from traffic, and we maintained those measurement findings into our calculations for mitigation, rather than reducing our assumptions in line with the Apex Acoustics survey. This has the effect that in practice, our mitigation advice must be relatively more robust, as it is the attenuation of low frequency noise that is the most onerous to achieve.

8 Impact of Existing Noise Sources on the Development

8.1 Mitigation for Achieving Good Acoustic Design

- 8.1.1 In order to assess the potential glazing and ventilation requirements for dwellings, noise ingress calculations were undertaken based on the methodology in BS EN 12354-3¹³. The following assumptions based on architectural plans (see Appendix 2) and site measurements were made regarding the development:

- 600mm thick solid stone external walls
- Tiled insulated roof with plasterboard ceilings
- Worst-case bedrooms with internal volumes of 25 m³
- 'Normal' internal surface finishes e.g. carpeted with curtains etc
- Glazed area of 2.3 m² per room

- 8.1.2 The areas of the proposed site where internal noise may exceed the standards are bedrooms on elevations facing Grimshaw Street. The calculations for rooms on this façade are therefore based on proposed mitigation in the form of enhanced glazing and acoustic trickle ventilators, full details of which are provided in Section 9 of this report.

- 8.1.3 Noise ingress calculations are shown in Table 6 below.

¹³ BS EN 12354-3:2000 Building acoustics. Estimation of acoustic performance in buildings from the performance of elements - Airborne sound insulation against outdoor sound

Table 6: Predicted internal noise levels

Description	External Noise Levels		Predicted Internal Noise Levels		BS 8233 Criteria		Exceedance of Criteria		Glazing and Ventilation
	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{Aeq,T}$	dB L_{AFmax}	
Courtyard rooms (daytime)	43	-	28*	-	35	-	- 7	-	Openable windows
Courtyard rooms (night time)	40**	60	25*	45*	30	45	- 5	0	Openable windows
Grimshaw Street bedrooms (daytime)	64	-	33	-	35	-	- 2	-	Option 1
Grimshaw Street bedrooms (night time)	54	76	23	45	30	45	- 7	0	Option 1

* Based on 15 dB attenuation through open window

** Nominal assumption

- **Option 1** - Glazing with minimum weighted sound reduction index of 31 dB $R_w + C_{tr}$ (e.g. 4/12/10); ventilators with a minimum element normalised sound level difference of 41 dB $D_{ne,W}$.

- 8.1.4 It can be seen from Table 6 that bedrooms on the Grimshaw Street façade are predicted to satisfy the internal noise level requirements with glazing with a sound reduction index of 31 dB $R_w + C_{tr}$; this could be achieved using double glazing with a 4/12/10 configuration. Background ventilation could be provided by a single acoustic rated trickle ventilator with a minimum element normalised sound level difference of at least 41 dB $D_{ne,w}$.
- 8.1.5 For dwellings with habitable rooms facing the courtyard, open window ventilation is likely to be acceptable for achieving both day and night time internal noise level criteria; however as a good practice measure and to allow for flexibility regarding the ability to close windows while still provided background ventilation to those rooms, we recommend that standard through frame trickle vents are installed in these rooms in combination with any standard thermal double glazing.

9 Glazing and Ventilation Specification

9.1 Bedrooms and Living Rooms in the Courtyard

9.1.1 Due to the minor uncertainty regarding the takeaway kitchen extract in the courtyard, and as a general good practice measure, in order to provide flexibility to close windows when desired while still allowing for background ventilation rates, we recommend that bedrooms and living rooms with glazing in the courtyard area incorporate;

- any standard thermal double glazing; and
- any standard through frame trickle ventilators;

9.2 Bedrooms and Living Rooms on Grimshaw Street

9.2.1 Glazing

9.2.2 Table 7 presents the minimum octave band sound insulation requirements for the 31 dB $R_w + C_{tr}$ rated glazing. The specification applies to complete glazed assemblies. Compliance with the specification should be confirmed by the glazing supplier. Slight shortfalls in individual octave bands may be acceptable in some cases but would need to be checked by an acoustic consultant to verify the break-in noise level criteria will not be exceeded.

Table 7: Minimum acoustic specification of glazing

Option	Typical configuration (glass/airgap/glass), mm	Sound Reduction Index, dB R_w in Octave Band Centre Frequency, Hz								R_w	C_{tr}	$R_w + C_{tr}$
		63	125	250	500	1k	2k	4k	8k			
Option 1	4/12/10	22	28	23	32	38	42	44	44	35	-4	31

9.2.3 Ventilation

9.2.4 The required performance is based on use of a single trickle ventilator to achieve the required ventilation. If more than one trickle ventilator is required to provide background ventilation rates then the performance of each individual ventilator must be increased in relation to the number of trickle ventilators used. For example if two ventilators are used then the performance of each ventilator must be 3dB better in each octave band than the values shown in Table 8 below. Ventilator selections should be confirmed with an acoustic consultant if in any doubt or if there are slight shortfalls in performance in any of the octave bands specified in Table 8.

Table 8: Minimum acoustic specification of trickle ventilator

Option	Ventilator type	Element normalised level difference, dB D_{ne} at Octave Band Centre Frequency, Hz								$D_{ne,w}$	C_{tr}	$D_{ne,w} + C_{tr}$
		63	125	250	500	1k	2k	4k	8k			
Option 1	Acoustic rated trickle ventilator	27	31	33	42	43	39	44	44	41	-3	38

10 Conclusions

- 10.1 A noise assessment was undertaken to predict the potential impact of existing noise levels on a proposed residential development at 1 – 3 Grimshaw Street, Burnley.
- 10.2 Short term noise measurements were taken at three locations around the site, and these were supplemented with a previous longer term survey carried out on adjacent roads prior to Covid-19 restrictions being in place. Analysis and comparison between both surveys was carried out in order to determine suitable representative noise levels for the site.
- 10.3 Specifications for glazing and ventilation have been provided in order to ensure suitable internal noise levels at the development. The most sensitive area of the proposed development are the bedrooms facing Grimshaw Street, which will require enhanced glazing configurations and acoustic rated trickle ventilators in order to mitigate traffic noise.
- 10.4 In conclusion, with the implementation of the mitigation measures detailed in this report, it is considered that a suitable and commensurate level of protection against noise will be provided to the occupants of the proposed accommodation.

11 Health and Safety Information

The Construction (Design and Management) Regulations (CDM 2015) are the main set of regulations for managing the health, safety and welfare of construction projects. CDM 2015 applies to all building and construction work and includes new build, demolition, refurbishment, extensions, conversions, repair and maintenance in order to reduce injury and ill health.

Under the regulation we are Designers. As a Designer, our decisions can affect the health and safety of workers and others who will construct, maintain, repair, clean, refurbish and eventually demolish or remove the building or structure, as well as those who will use it as a completed workplace. Taking risks arising from the design into account can positively affect the project and make it easier for these risks to be managed by contractors and those who will maintain or use the structure. Our designs must contribute to the safe delivery of a project without risks to health.

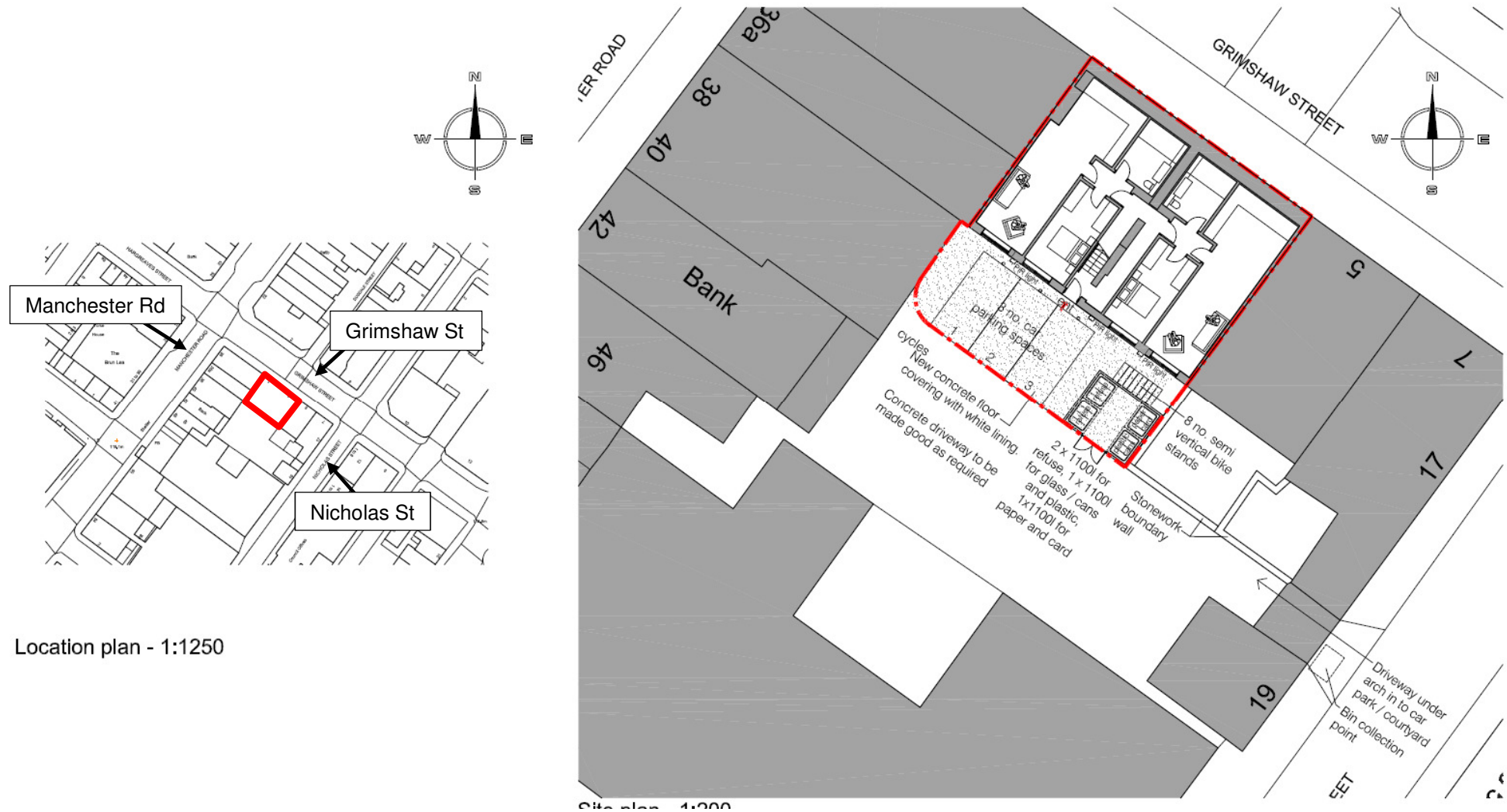
As Designers we must:

- understand and be aware of significant risks that workers and users can be exposed to and how these can arise from our design decisions;
- have the right skills, knowledge, and experience and be adequately resourced to address the health and safety issues likely to be involved in the design;
- check that Clients are aware of their duties;
- co-operate with others who have responsibilities, in particular the Principal Designer;
- take into account the general principles of prevention when carrying out our design work;
- provide information about the risks arising from our design;
- co-ordinate our work with that of others in order to improve the way in which risks are managed and controlled.

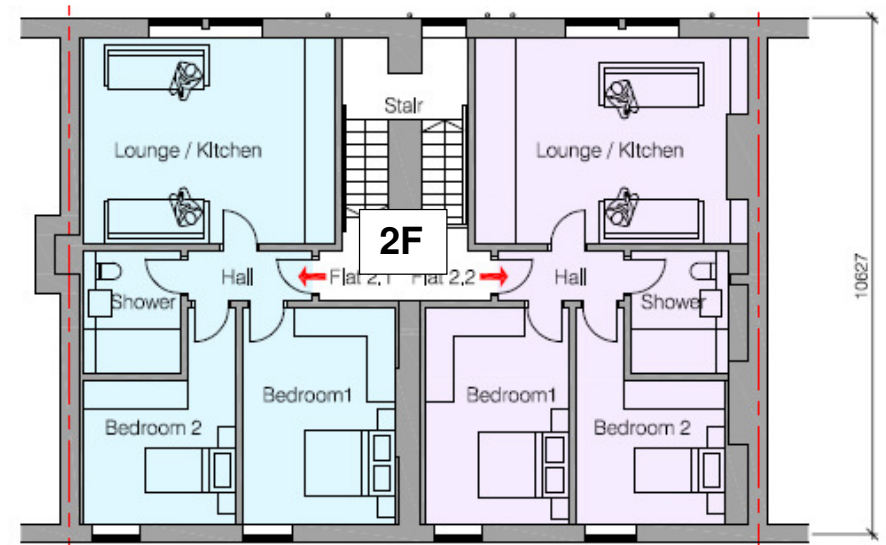
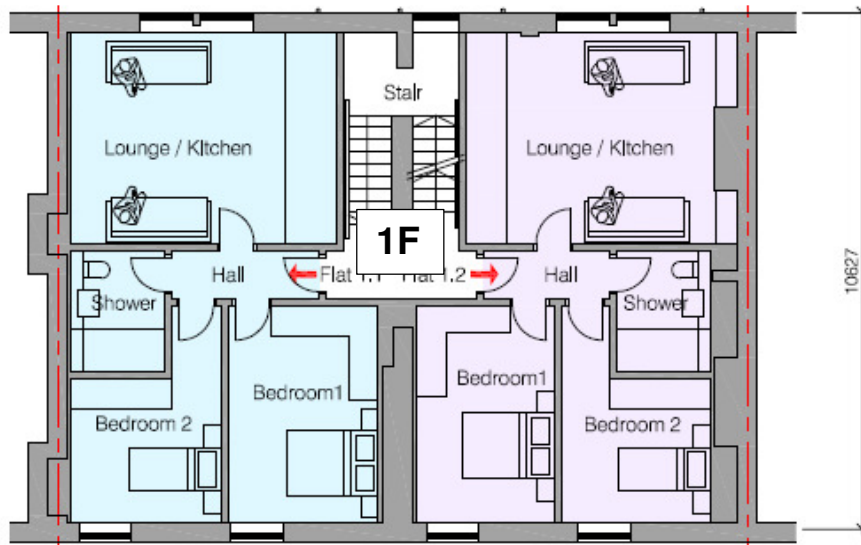
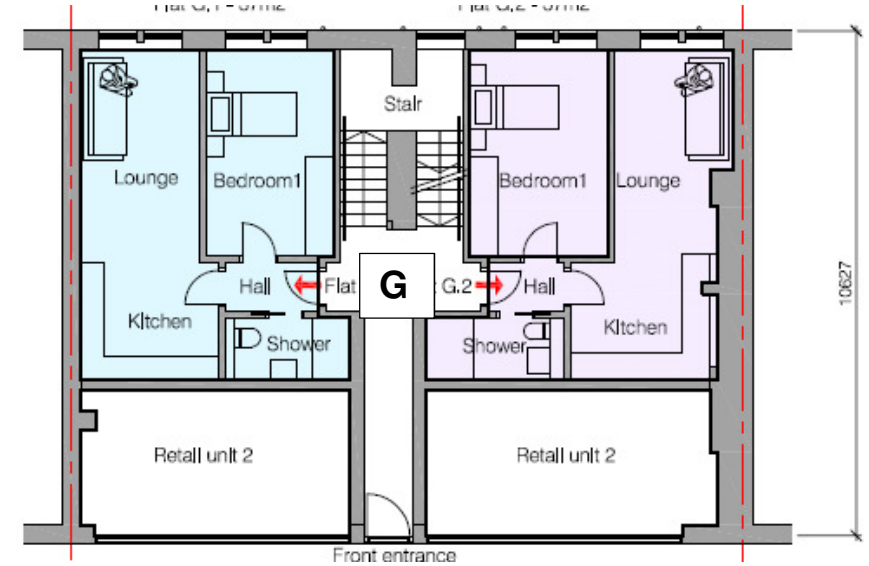
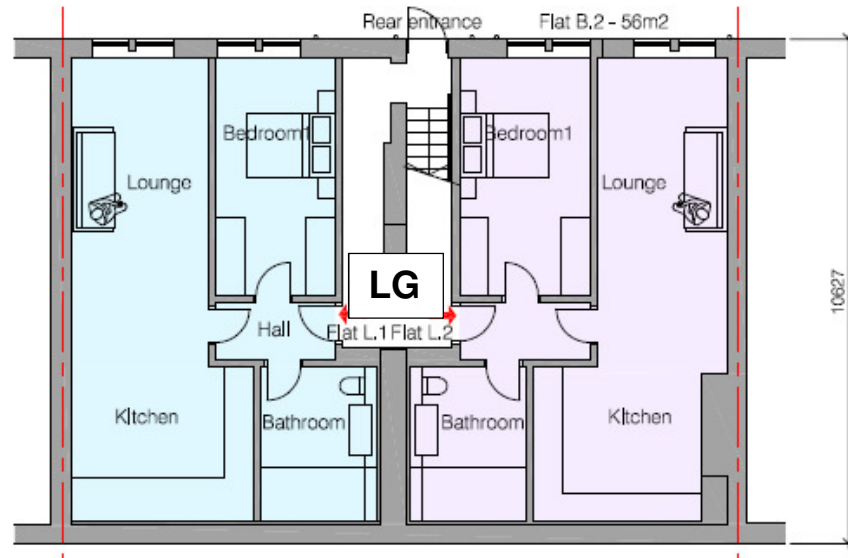
Our designer's risk assessment for this project and the mitigation work we have recommended is shown in Appendix 3.

APPENDICES

Appendix 1: Site Location and Layout Plan



Appendix 2: Proposed Plans (Grimshaw Street runs along the bottom edge of the plans as viewed on page)



Appendix 3: DESIGNERS RISK ASSESSMENT

Project:	1 – 3 Grimshaw Street, Burnley	Job No.	102520
		By/Date	26/03/2021
		Approved (Acoustic Consultant)	MR

[illegible]

Project:	1 – 3 Grimshaw Street, Burnley	Job No.	102520
		By/Date	26/03/2021
		Approved (Acoustic Consultant)	MR

Stage: Construction		
Hazard	Action By Designer	Residual Hazard
Noise	1. To eliminate hazard Cannot eliminate.	
	2. To reduce hazard Manual Handling Main contractor/ builder to undertake a detailed risk assessment and develop a suitable method statement in respect of construction phase noise and impact upon construction workers and surrounding areas. Consider establishing soundproofed areas for cutting and other noisy operations.	Risk of hearing damage. Risk of loss of acoustic amenity to neighbouring areas.
Manual Handling	1. To eliminate hazard Cannot eliminate.	
	2. To reduce hazard Main contractor/ builder to undertake a detailed risk assessment and develop a suitable method statement in respect of manual handling during construction. Consider use of smaller sizes of plasterboard to reduce weights.	Risk of musculoskeletal damage.
Vibration	1. To eliminate hazard Cannot eliminate.	

Stage: Construction		
Hazard	Action By Designer	Residual Hazard
	2. To reduce hazard Main contractor/ builder to undertake a detailed risk assessment and develop a suitable method statement in respect of construction phase vibration.	Risk of Hand Arm Vibration Syndrome to workers
Use of caulking or sealants	1. To eliminate hazard Cannot eliminate.	
	2. To reduce hazard Main contractor/ builder to undertake a detailed risk assessment and develop a suitable method statement in respect of use of caulking and sealants.	Follow manufacturers recommended safety guidelines during construction. Refer to data sheets from suppliers for more information. Consider wearing gloves
Falls from height	1. To eliminate hazard Cannot eliminate.	
	2. To reduce hazard Main contractor/ builder to undertake a detailed risk assessment and develop a suitable method statement in respect of falls from height. Consider the use of scaffolding, suitable work platforms and fall arrest systems.	Risk of injury and death.
Falling Material	1. To eliminate hazard Cannot eliminate.	
	2. To reduce hazard Main contractor/ builder to undertake a detailed risk assessment and develop a suitable method statement in respect of falling material Consider use of platforms, scaffold or similar to catch any falling materials.	Risk of injury from falling materials.
Unstable Structure	1. To eliminate hazard Cannot eliminate.	

Stage: Construction		
Hazard	Action By Designer	Residual Hazard
	2. To reduce hazard Competent and qualified structural engineer to undertake calculations and determine if structure is capable of supporting additional weights associated with the acoustic design elements such as plasterboard ceilings to top floor and acoustic rated glazing.	Follow manufacturers recommended safety guidelines during construction. Refer to data sheets from suppliers for more information. Risk of stability and durability issues. Client to seek further guidance from qualified and competent building designers on suitability.

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Glossary of Terms

Decibel (dB) The unit used to quantify sound pressure levels; it is derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 μPa , the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is usually only perceptible under controlled conditions.

dB L_A Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB L_A broadly agree with an individual's assessment of loudness. A change of 3 dB L_A is the minimum perceptible under normal conditions, and a change of 10 dB L_A corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB L_A ; normal conversation about 60 dB L_A at 1 meter; heavy road traffic about 80 dB L_A at 10 meters; the level near a pneumatic drill about 100 dB L_A .

$L_{A90,T}$ The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 2014+A1:2019 it is used to define background noise level.

$L_{Aeq,T}$ The equivalent continuous sound level. The sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.

L_{Amax} The highest A weighted noise level recorded during the time period. It is usually used to describe the highest noise level that occurred during the event.

R_w Single number rating used to describe the sound insulation of building elements and is defined in BS EN ISO 10140-2: 2010 (formerly BSEN ISO 140-3:1995). It is derived by measurement under laboratory conditions and does not take into account the effects of flanking transmissions.

$D_{ne,w}$ The weighted element-normalized level difference is a single figure rating used to describe the sound insulation of small elements within a larger construction and is defined in BS EN ISO 10140-2:2010 (BSEN ISO 140-10:1991). It is most often used to rate the sound insulation performance of ventilator units e.g. trickle vents.

C_{tr} A single-number spectrum adaptation term used to characterise the sound insulation rating with respect to urban traffic. It is defined in ISO 717-1:2013.

